

What is claimed is:

1. A device comprising:
an electronically controllable drop ejection device in fluid
communication with an electrochemical cell, the drop ejection device capable of
5 conveying quantities of a chemical composition capable of oxidative reaction
into the electrochemical cell.
2. The device of claim 1 further comprising:
a fluid storage chamber containing the chemical composition
capable of oxidative reaction, the fluid storage chamber in communication with
10 the drop ejection device; and
an electrochemical cell having an inlet and an outlet and anode,
the electrochemical cell supporting oxidative reaction of the chemical
composition.
3. The device of claim 1 further comprising a channel for removing a
15 byproduct of the oxidative reaction from the electrochemical cell, the channel
communicating with the electronically controllable drop ejection device, wherein
the electronically controllable drop ejection device introduces the reaction
byproduct into contact with the chemical composition capable of oxidative
reaction in a stoichiometric relationship appropriate for function of the
20 electrochemical cell.
4. The device of claim 3 wherein the drop ejection device is
configured to affect proportionate delivery of the byproduct of oxidative reaction
and the chemical composition capable of oxidative reaction into contact with the
electrochemical cell.
- 25 5. The device of claim 1 further comprising at least one external
interface device, the external interface device receiving at least one input
command from a source external to the device, the input command actionable
on the drop on demand ejection device.

6. The device of claim 1 further comprising an admixer in fluid communication with the drop ejection device, the admixer tank configured to receive the chemical composition capable of oxidative reaction and at least one other additional material.

5 7. The device of claim 6 wherein the drop ejection device includes at least one electronically controllable nozzle member.

8. The device of claim 7 wherein the nozzle member directs ejection of chemical composition capable of oxidative reaction into a fluid stream, the fluid stream being conveyed onto the anode of the electrochemical cell.

10 9. The device of claim 7 wherein the nozzle member directs the chemical composition into the admixer, the fluid stream conveyed from the admixer into contact with the anode.

10. The device of claim 1 wherein a first electronically controllable drop ejection device is in fluid communication with a first composition capable of oxidative reaction and a second electronically controllable drop ejection device is in fluid communication with at least one second composition capable of admixture with the first chemical composition in a manner which facilitates the oxidative reaction.

11. The device of claim 10 wherein the compositions are delivered to the anode in a manner that accomplishes admixture.

12. The device of claim 10 further comprising an admixer in fluid communication with the drop ejection devices, the admixer configured to receive the materials and convey admixed materials to the electrochemical cell.

13. The device of claim 10 further comprising a channel for removing at least one reaction byproduct from the electrochemical cell, the channel communicating with the second electronically controllable drop ejection device, wherein the second electronically controllable drop ejection device introduces
5 the reaction byproduct into contact with the chemical composition capable of oxidative reaction in a stoichiometric relationship appropriate for function of the electrochemical cell.

14. The device of claim 1 wherein the electronically controllable drop ejection device comprises a resistor surface having at least one catalytic
10 material positioned thereon, the catalytic material reactive with a component in the chemical composition capable of oxidative reaction to effect at least partial catalytic reforming of the component of the chemical composition.

15. The device of claim 14 wherein catalytic reforming occurs prior to exit from the drop ejection device.

15 16. The device of claim 1 wherein the drop ejection device further comprises a resistor, the resistor having a surface reactive with a component of the chemical composition capable of oxidative reaction.

17. The device of claim 16 wherein the resistor comprises at least one catalytic material, the catalytic material capable of supporting at least partial
20 catalytic reformation of at least one component of the composition capable of oxidative reaction.

18. The device of claim 10 wherein the drop ejection device further comprises a resistor, the resistor having a surface which is reactive with a component of the second chemical composition.

19. A cartridge for use with an electrochemical cell comprising:
a reservoir containing a volume of a chemical composition
containing at least one compound capable of oxidative reaction;
an electronically controllable drop ejection device in
5 communication with the reservoir, the drop ejection device capable of
dispensing measured quantities of the associated chemical composition from
the reservoir into a suitable electrochemical cell.

20. The cartridge of claim 19 wherein the reservoir is composed of at
least two chambers, each chamber containing a compound suitable for
10 introduction into the electrochemical cell.

21. The cartridge of claim 20 wherein a chamber is configured to
accumulate a useful byproduct of oxidative reaction produced in the
electrochemical cell for subsequent reintegration dispatch through the drop
ejection device.

15 22. The cartridge of claim 19 wherein the drop ejection device
includes:
an electronically controllable nozzle member in communication
with a reservoir containing a volume of chemical composition containing at least
one compound capable of oxidative reaction;
20 a control mechanism associated with the nozzle member, the
mechanism controlling the ejection of a measured quantity of the chemical
composition from the storage chamber.

23. The cartridge of claim 19 comprising:
a first chamber containing at least one compound capable of
25 oxidative reaction; and
at least one second chamber containing at least one material
compatible with the compound capable of oxidative reaction.

24. The cartridge of claim 23 wherein the material compatible with the compound capable of oxidative reaction includes at least one of additives, diluents and the like.

5 25. The cartridge of claim 19 wherein the electronically controllable drop ejection device comprises at least one resistor, the resistor having a surface which is reactive with at least one component of the chemical composition containing at least one compound capable of oxidative reaction.

10 26. The cartridge of claim 19 wherein the electronically controllable drop ejection device comprises a resistor having a surface, the resistor surface reactive with at least one material compatible with the compound capable of oxidative reaction.

27. An electrochemical system comprising:
an electrochemical cell capable of sustaining at least one oxidation reaction process; and
15 a fuel supply apparatus delivering a composition containing at least one compound capable of oxidative reaction into the electrochemical cell, the fuel supply apparatus comprising at least one electronically controllable drop ejection device and at least one fluid storage chamber.

20 28. The electrochemical system of claim 27 wherein the electrochemical cell comprises an anode and the fuel supply apparatus introduces a quantity of the composition into contact with the anode.

29. The electrochemical system of claim 28 wherein the electronically controllable drop ejection device comprises an electronically controlled nozzle member in fluid communication with the fluid storage chamber.

25 30. The electrochemical system of claim 29 wherein the fuel supply apparatus comprises at least two fluid storage chambers, the fluid storage chambers containing materials utilized in the oxidative reaction process occurring in the electrochemical cell.

31. The electrochemical system of claim 27 wherein the composition containing at least one chemical component capable of undergoing oxidative reaction is contained in a first fluid storage chamber and wherein a second fluid storage chamber contains at least one compound which is complementary to the oxidative process occurring in the electrochemical cell.

32. The electrochemical system of claim 31 wherein the fuel supply apparatus further comprises at least one compartment configured to transferably receive at least one byproduct of the oxidative reaction occurring in the electrochemical cell.

33. The electrochemical system of claim 29 wherein electrochemical cell includes a channel for removing at least one reaction byproduct, the channel conveying the reaction byproduct into communication with the electronically controllable drop ejection device, wherein the electronically controllable drop ejection device introduces the reaction byproduct into contact with the chemical composition capable of oxidative reaction in a stoichiometric relationship appropriate for function of the electrochemical cell.

34. The electrochemical system of claim 33 wherein the fuel supply apparatus further comprises an electronically controlled nozzle member in fluid communication with a fluid storage chamber.

35. The electrochemical system of claim 31 further comprising at least one sensor detecting a product of the oxidative reaction occurring in the electrochemical cell.

36. The electrochemical system of claim 34 further comprising an external interface device, the external interface device receiving an input command from a source external to the device, the input command actionable on the drop ejection device.

37. The electrochemical system of claim 36 further comprising an admixer in fluid communication with the nozzle member, the admixer configured to receive the chemical composition capable of oxidative reaction and at least one additional material and to initiate admixture of the received materials.

5 38. The electrochemical system of claim 27 further comprising:
a channel for removing at least one reaction byproduct from the electrochemical cell, the channel communicating with the associated electronically controllable drop ejection device, wherein the associated electronically controllable drop ejection device introduces the reaction byproduct
10 into contact with the composition capable of oxidative reaction in a stoichiometric relationship appropriate for function of the electrochemical cell.

39. The electrochemical system of claim 38 wherein the drop ejection device includes at least one electronically controllable nozzle member.

15 40. The electrochemical system of claim 27 further comprising an external interface device, the external interface device receiving an input command from a source external to the device, the input command actionable on the drop ejection device.

20 41. The electrochemical system of claim 27 wherein the drop ejection device further comprises at least one resistor, the resistor having a surface which is reactive with at least one component of the composition capable of oxidative reaction.

25 42. The electrochemical system of claim 41 wherein the reactive surface of the resistor has at least one catalytic material imparted thereon, the catalytic material capable of supporting at least partial catalytic reformation of at least one component of the composition capable of oxidative reaction.

43. A power generator comprising:
an electrochemical cell having at least one reactive surface;
an electronically controllable jetting device supplying a fuel to the
at least one reactive surface in the electrochemical cell; and

5 a recirculating circuit configured to convey a portion of at least one
chemical byproduct produced in the electrochemical cell into reintegrative
contact with the fuel.

44. The power generator of claim 43 wherein the electronically
controllable jetting device comprises:

10 a reservoir containing a fuel capable of oxidative reaction;
a nozzle member in communication with the reservoir; and
a controller operable on the nozzle member, the controller
regulating ejection of discrete volumes of fuel composition into the
electrochemical cell.

15 45. The power generator of claim 44 wherein the jetting device further
comprises at least one resistor surface, the resistor surface having at least one
catalytic material positioned thereon, the catalytic material reactive with at least
one component of the fuel to initiate at least partial catalytic reforming of at least
one component of the fuel prior to entry into the electrochemical cell.

20 46. The power generator of claim 44 further comprising a regulator,
the regulator operable on the recirculating circuit to deliver measured quantities
of recirculated byproduct into contact with the fuel in at a specified ratio range,
the specified ratio range being one which will facilitate oxidative reaction
processes proceeding in the electrochemical cell.

25 47. The power generator of claim 43 further comprising an admixer in
fluid communication with the drop ejection device, the mixing tank configured to
receive the fuel and at least one additional material and initiate admixture of the
received materials.

48. A device comprising:
a storage chamber containing a fuel;
an electrochemical cell associated with the fuel storage chamber;
an electronically controllable jetting device for delivering discrete
5 quantities of fuel from the storage chamber to the electrochemical cell;
a recirculation circuit transporting at least a portion of a byproduct
material produced in the electrochemical cell into contact with the fuel delivered
from the storage chamber; and
a power consuming device powered by the electrochemical cell.

10 49. The device of claim 48 wherein the jetting device includes an
electronically controllable nozzle member.

50. The device of claim 49 wherein the storage chamber includes at
least two storage compartments, one compartment adapted to contain the fuel
and an additional compartment adapted to contain at least one component
15 which is complimentary to the oxidative process occurring in the electrochemical
cell.

51. A method for delivering a primary material to an electrochemical
cell comprising the step of ejecting a quantity of primary material from an
electronically controllable drop ejection device, the quantity of fluid ejected
20 being determined by at least one of consumption demands of the
electrochemical cell, composition of the primary material, composition of
additional material introduced into the electrochemical cell, and quantity of
additional material introduced into the electrochemical cell contemporaneous
with the ejection of the material.

25 52. The method of claim 51 wherein the primary material is a
composition which contains at least one compound capable of undergoing
oxidative reaction upon introduction into the electrochemical cell.

53. The method of claim 51 wherein the primary material is a fuel.

54. The method of claim 51 wherein the additional material is an additive complimentary with the fuel.

55. The method of claim 54 further comprising the step of ejecting a quantity of additional material from an additional electronically controllable drop
5 ejection device, the quantity of additional fluid ejected being in proportionate relationship with the quantity of primary material ejected.

56. The method of claim 52 further comprising the step of integrating a byproduct of oxidative reaction occurring in the electrochemical cell into the primary material.

10 57. The method of claim 56 wherein the byproduct oxidative reaction is conveyed to a drop ejection device for ejection at a rate proportionate to ejection of the primary material.

58. The method of claim 54 further comprising the step of partially reforming at least one component of at least one of the primary material and the
15 additional material.

59. The method of claim 58 wherein partial reformation is initiated by contact with at least one resistor present in the drop ejection device.

60. The method of claim 59 wherein the resistor includes at least one material which catalyzes partial reformation.

61. .A method for initiating reaction of a chemical compound comprising the steps of:

introducing a chemical compound into at least one fluid chamber located in a drop ejection nozzle member;

5 exposing the chemical compound to a catalyst located in the fluid chamber in a manner which initiates a catalytic reaction;

ejecting the chemical compound from the fluid chamber after initiation of the catalytic reaction.

62. The method of claim 61 further comprising the step of exposing
10 the chemical compound introduced into the fluid chamber to an elevated temperature sufficient to facilitate catalysis.

63. The method of claim 61 wherein the catalytic reaction proceeds for an interval after the ejection step.

64. The method of claim 63 wherein the catalytic reaction is integrated
15 into a multi-step chemical process.

65. The method of claim 61 wherein the catalytic reaction involves partial reformation of the chemical compound.

66. The method of claim 65 wherein the chemical compound is capable of undergoing oxidative reaction.

20 67. The method of claim 61 further comprising the step of delivering the chemical compound to an end use destination.

68. The method of claim 67 wherein the end use destination is an electrochemical cell.

25 69. The method of claim 67 wherein the end use destination is an analytical device.

70. The method of claim 67 wherein the end use destination is a supplemental chemical compound.

71. A device comprising:
means for emitting quantities of at least two materials from
respective sources, the emitting means capable of generating a composition in
which the at least two materials are in a stoichiometric relationship suitable for
5 function of an electrochemical cell.

72. The device of claim 71 further comprising:
means for removing a byproduct of reaction occurring in the
electrochemical cell and reintegrating the byproduct into the stoichiometric
composition in an electronically controllable manner.